



Figure 1

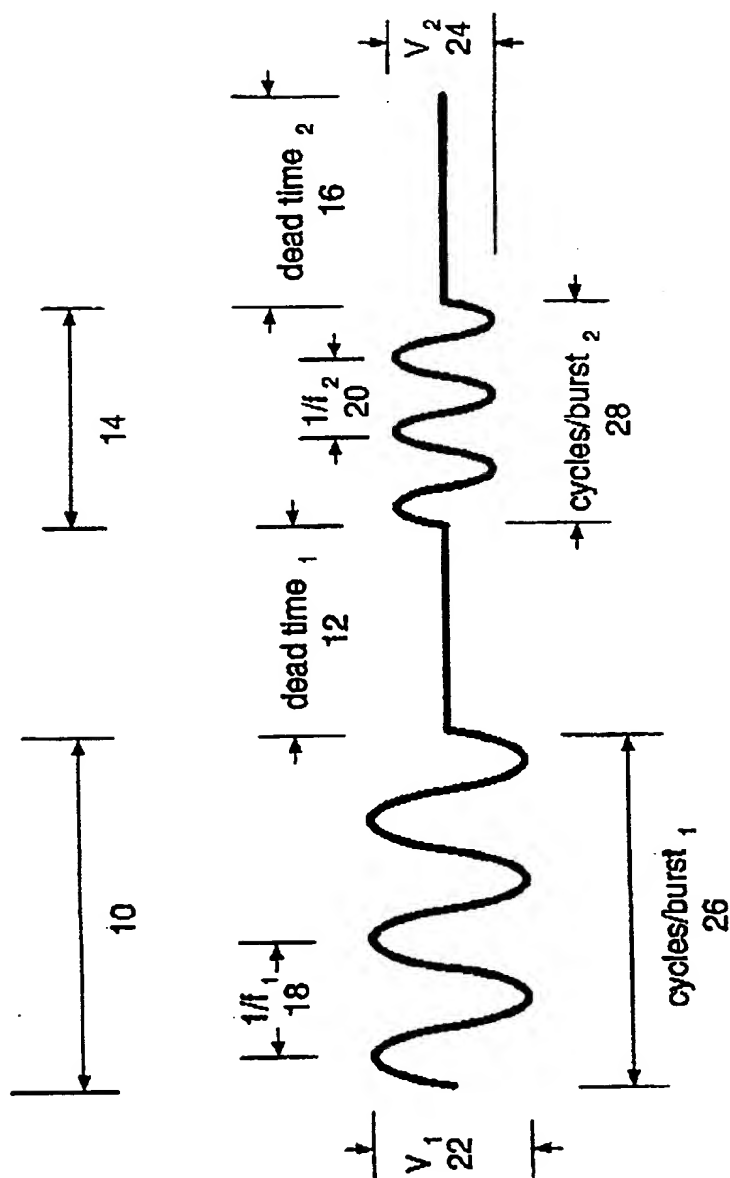


Figure 2

FIG. 3

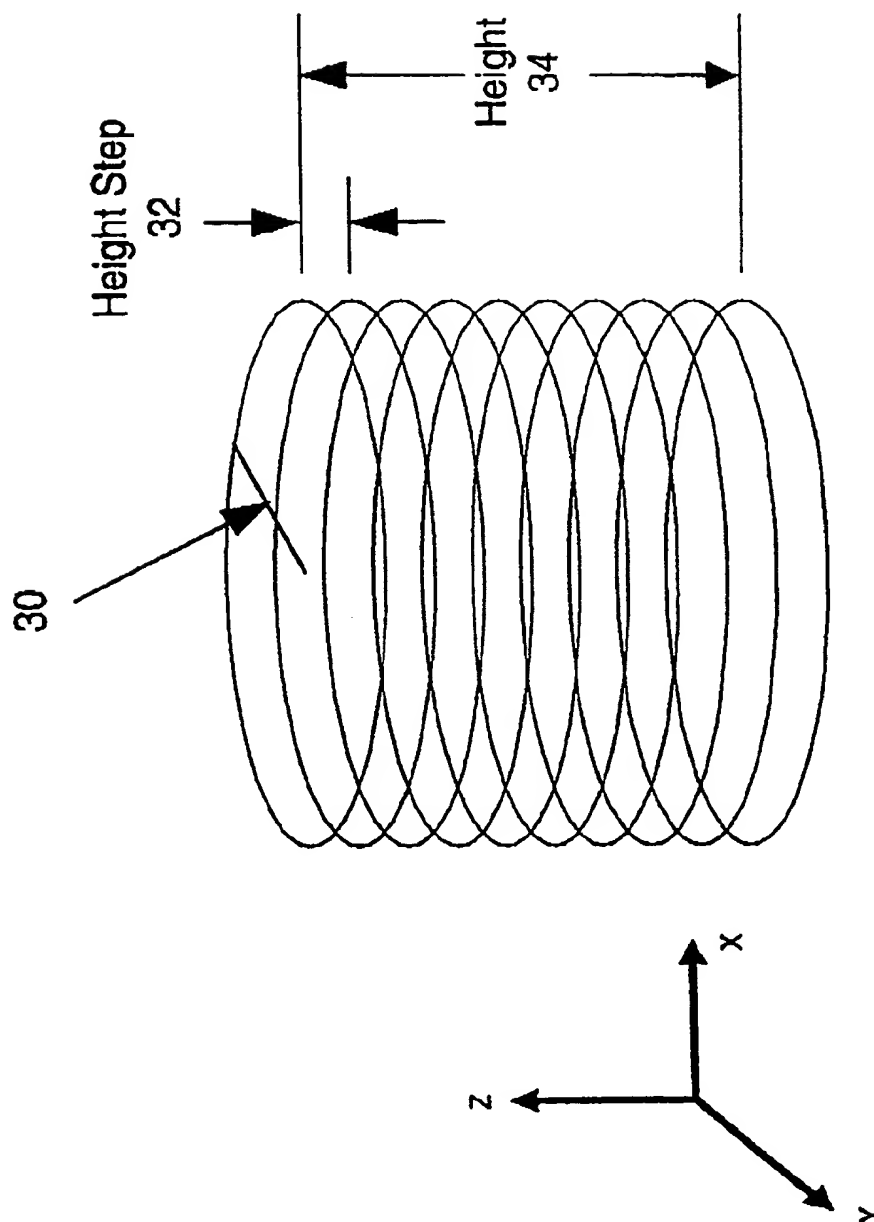


Figure 3

treatment
vessels

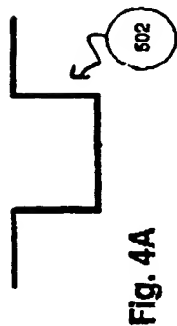


Fig. 4A

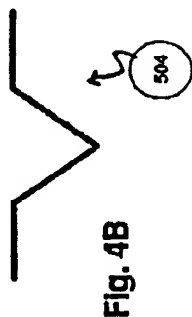


Fig. 4B

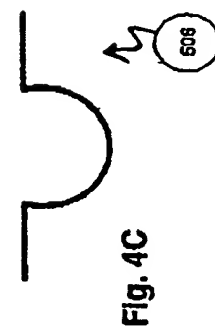


Fig. 4C

pre-treatment
assembly

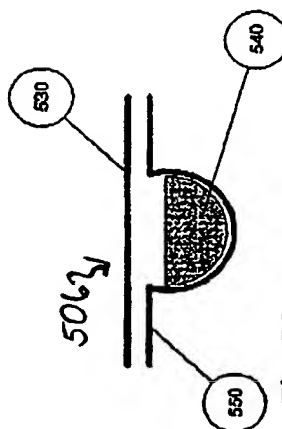


Fig. 5A

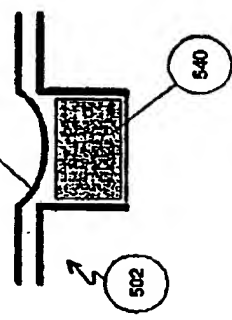


Fig. 5B

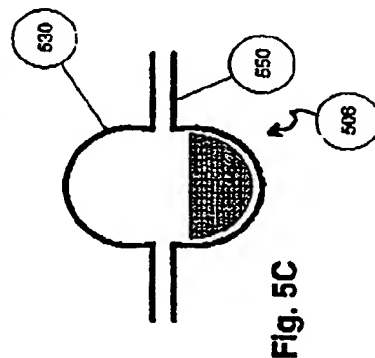


Fig. 5C

post-treatment
transfer

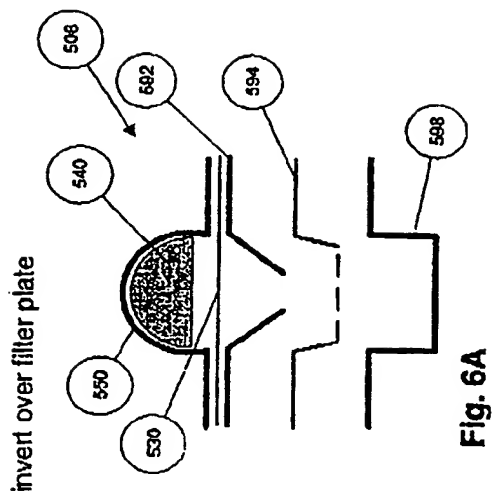


Fig. 6A

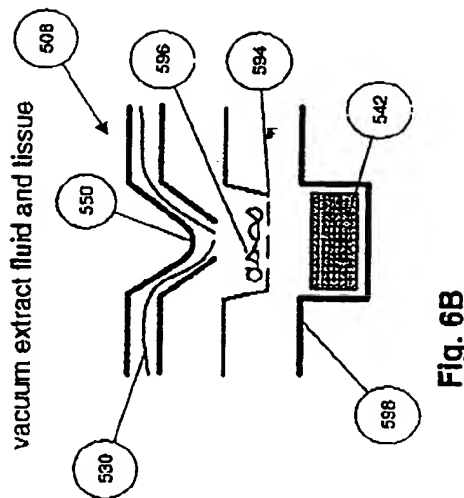


Fig. 6B

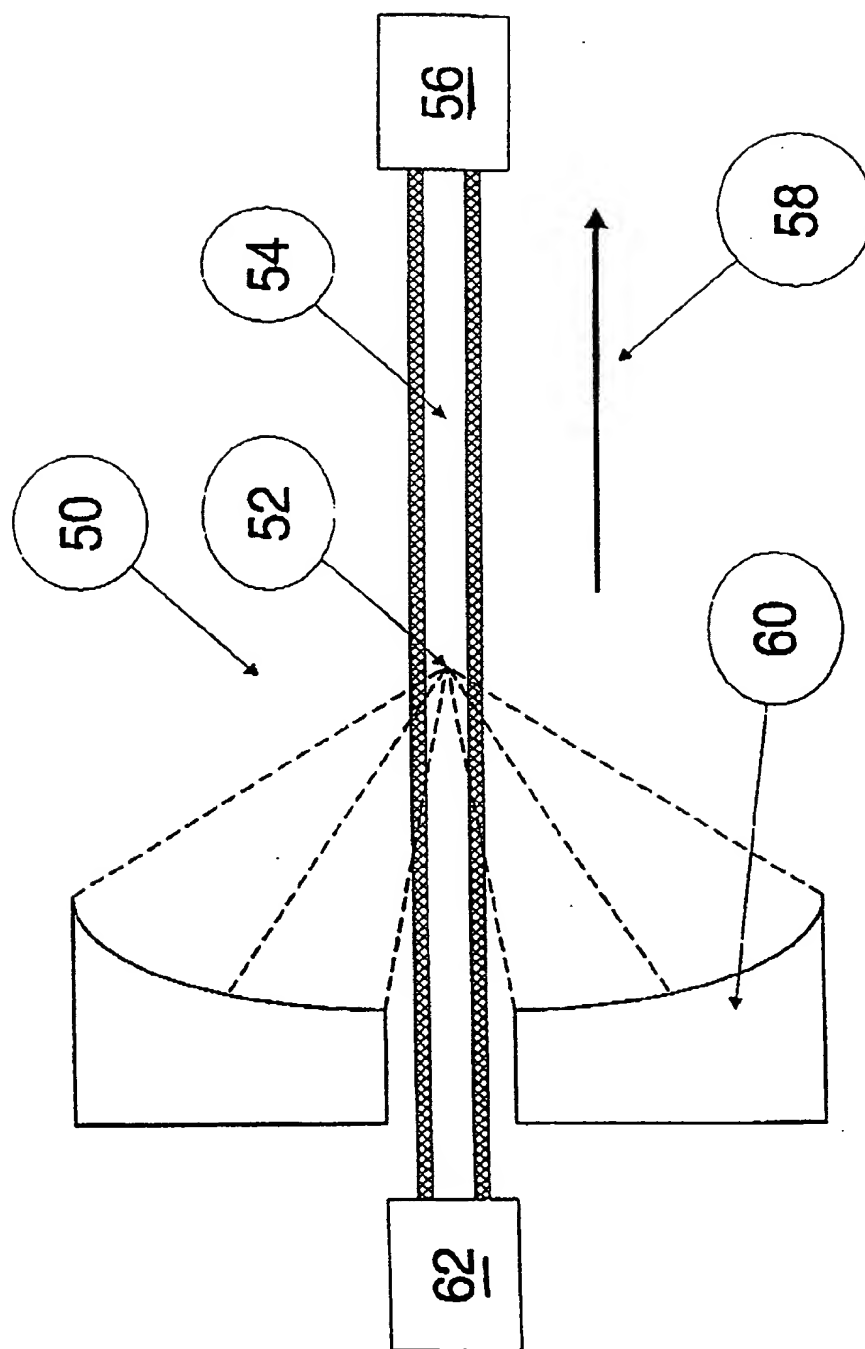


Figure 7

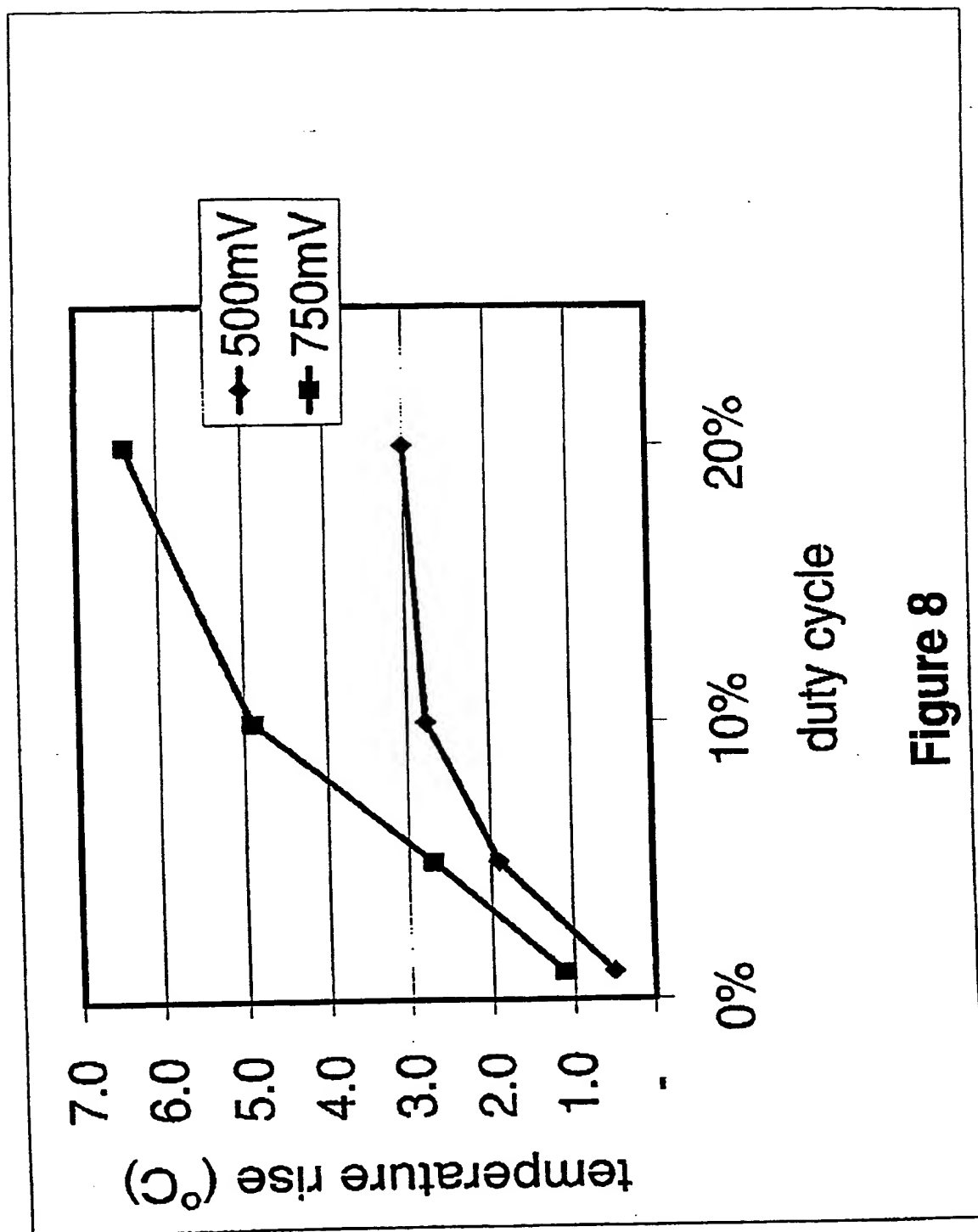


Figure 8

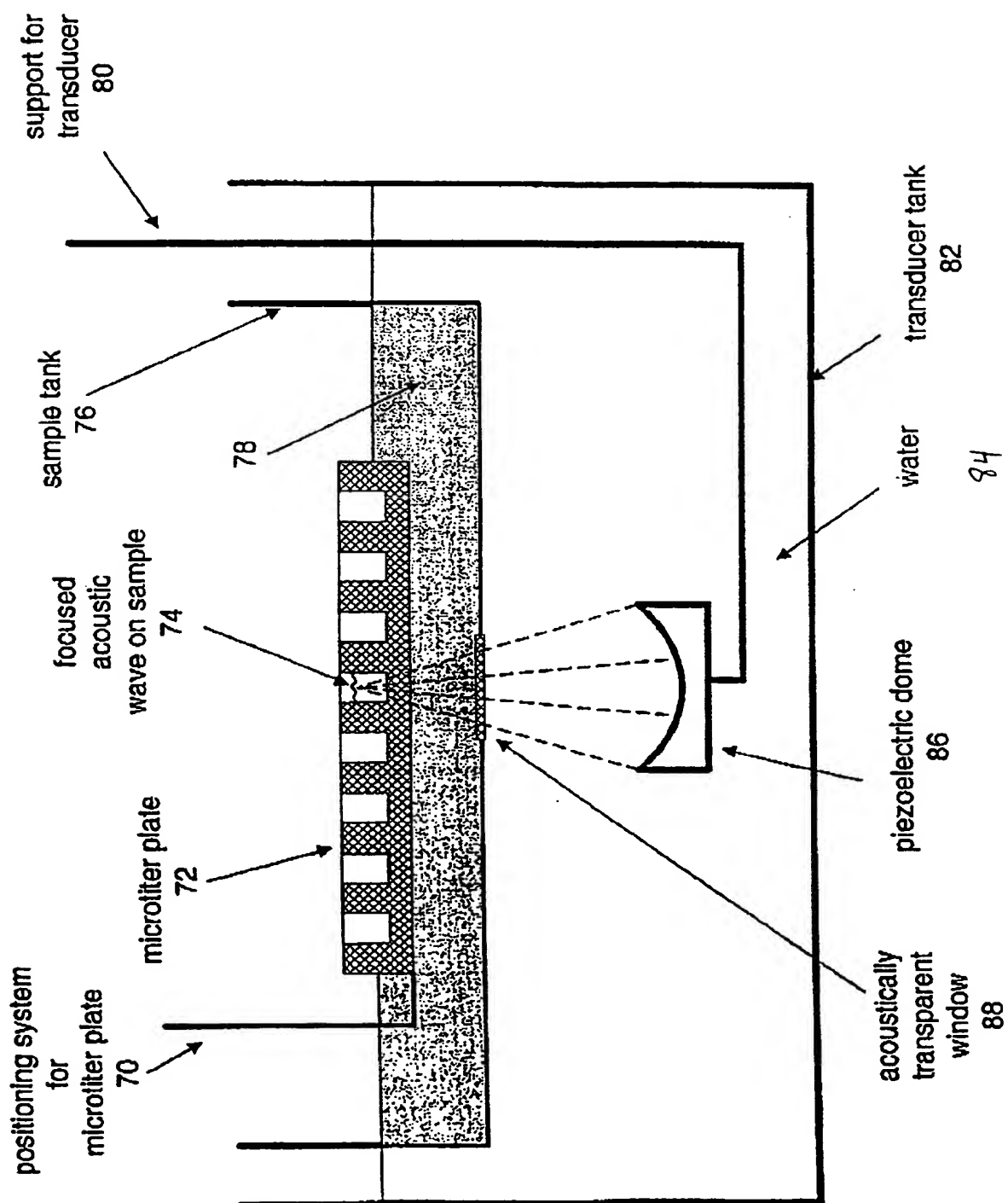


Figure 9

Figure 10

SYSTEM SPECIFICATIONS

PERFORMANCE:

Format

Treatment time

Temperature

Acoustic parameters

Frequency

Treatment profile

Acoustic Waveform

acoustic mask under plate

Traversal time between samples

Atmosphere Control

CONSUMABLE:

PROCEDURE:

MECHANICAL:

Format

Water Bath

EXTRACTION	TRANSFORMATION	RESEARCH
microtiter	microtiter	variable
50 sec per well		variable
bath temp control		
Sample temp rise		
+4 to +25C	+4 to +40C	-10 to +40C
<4C	variable	variable
1.1 MHz	1.1MHz	1.1,3.3MHz
shock	sine, shock	sine, shock
2 sec	2 sec	variable
none	gas, overpressure	gas, overpressure
96well PCR plate, off-the-shelf	24 well plate	variable
200ul standard. Other options	variable	
yes	yes	single and multi
optional	yes	optional
transfer to plate	aliquot cell culture into plate	
add fluid	treat at controlled temperature	
heat seal plate	transfer to growth medium	
store at -80C		
treat at +4C		
place on vacuum fixture		
vacuum transfer to microtiter		
option: filter at transfer		
benchtop plus half-rack and chiller	benchtop plus half rack	cart plus rack
1 gal distilled water	1 gal distilled water	15 gal
Water volume		
temperature control		
circulation pump		
degassing system		

FIGURE 11

Figure 11

SYSTEM SPECIFICATIONS	EXTRACTION	TRANSFORMATION	RESEARCH
INSTRUMENT CONTROL: LabVIEW			
x-y-z positioning (sample)	yes	yes	yes
z' axis (transducer)	manual, 25mm range	manual, optional auto	manual
Temperature feedback to protocol	yes	yes	yes
partial treatments	yes	optional	no
cavitation detection	no	optional	yes
video detection and analysis	no	optional	yes
USER INTERFACE: LabVIEW			
treatment protocol	fixed	user adjustable	flexible
select treatment positions	pre addressed	user adjustable	flexible
temperature profile record	optional	yes	yes
timing information	yes	yes	yes
ELECTRICAL:			
Power: 110V, 20A			
EQUIPMENT:			
Chiller	yes	no	yes
RF Amplifier	yes	yes	yes
Arbitrary waveform generator	yes	yes	yes
oscilloscope	no	optional	yes
Computer	yes	yes	yes
motion control	yes	yes	yes
I/o boards			
amplifier	yes	yes	yes
xy stage	no	optional	yes
IR temperature measurement	yes	yes	yes
video	no	optional	yes
laser sight/cross-hairs	yes	yes	yes
vacuum fixture	yes	no	no
Transducer			
matching network			
cables			
circulation pump			
convection cooling			
filter			
cavitation detection	no	optional	yes

Figure 12

LabVIEW PROGRAMMING TASKS

GENERAL

	Extraction	Transformation
display revision level	x	x
safety interlocks	x	x
time and date stamp		x
STOP function	x	x
save configuration to file	user can reset defaults	x
operating parameters		x ^f
protocol		x
save data to file		
treatment positions and protocols		x
temperature profile		x
error conditions		x
password protection on Vis	x	x
load configuration from file		x
user selects treatment positions	x	x

DISPLAY

User selectable treatment positions -graphical	x	x
current status		
treatment position -graphical	x	x
current protocol	by name	x
-voltage		x
-duty cycle		x
-etc		x
time to finish current sample	x	x
safety interlock status	x	x
sample temperature, graph and current temp		x
time and date		x

ULTRASONICS

initialize instrument(s)	x	x
stop function	x	x
mix and treat	predetermined	user programmable
frequency	predetermined	x
voltage-treat	predetermined	x
voltage-mix		x
pulselength-treat	predetermined	x
pulselength-mix		x
deadtime-mix>treat		x
deadtime-treat>mix		x
Total cycles (or time)	predetermined	x
cavitation detection		optional

POSITIONING

setup and diagnostics		
initialize stepper control board	x	x
calibrate (home)	x	x
check limits (limit switches)	x	x

Transformation

predetermined

x

x

x

x

X

X

x

x

x

x

optional

optional

pause process to cool

go to next well at set temperature rise

Figure 13